Referring initially to claim 36, such claim is directed to a temperature sensing device including, inter alia, a pair of continuous flexible electrically conductive wires covered by a flexible insulation material. As claimed, the wires have end portions at one end that are free of the flexible insulation material and extend through parallel passages in a preformed cylindrical member made of unfired compactible mineral insulation material. Also, temperature sensing means are provided exteriorly of the preformed cylindrical member, and a one-piece metal tube surrounds the mineral insulation material, wire end portions and temperature sensing means, such metal tube having an initial size to permit insertion over the preformed cylindrical member of mineral insulation material and being compressed to a smaller diameter thereby to compact the mineral insulation material tightly around the end portions of the wires.

Admittedly it is generally known from Frazier to compact a mineral insulation material such as magnesium oxide in the space between the inner surface of a sheath 11 and the otherwise exposed surfaces of conductive rods or wires 12, 13. Also, in the Fig. 4 embodiment of Stevens, the spaces within the sensing element tube 78 and insulator 80 are filled with a powdered insulating material such as aluminum oxide to provide an insulating and cushioning effect. However, in neither of these references is a preformed cylindrical member of unfired compactible mineral insulation material used to position insulation around the end portions of a pair of flexible electrically conductive wires to facilitate assembly of the mineral insulation material and wire end portions and associated temperature sensing means within a metal tube having an initial size to permit insertion over the preformed cylindrical member and compressed to a smaller diameter to compact the mineral insulation material tightly around the end portions of the wires as recited in newly presented claim 36.

Stevens does of course disclose in column 3, lines 42-50, that after a plurality of bare lead wires are inserted in the lead wire tube 76 and the tube is filled with an insulating material 91 such as powdered magnesium oxide, the tube may be swaged to a reduced diameter causing the oxide powder to become compressed and packed firmly around the bare lead wires effecting complete electrical insulation thereof. However,

this is entirely different from applicant's novel claimed temperature sensing device which utilizes a preformed cylindrical member of unfired compactible mineral insulation material to facilitate placement of the mineral insulation material around the conductive wires and within the metal tube prior to compressing the metal tube to a smaller diameter to compact the mineral insulation tightly around the wires. Stevens also teaches the use of a hard ceramic insulator 80 to provide support for a pair of resistance elements 44, 46 without a metal sensing tube 78. However, Stevens specifically recognizes in column 5 that when a hard ceramic insulator 80 is used, the spaces within the sensing element tube 78 and insulator 80 must be filled with a powdered insulating material such as aluminum oxide to provide a cushioning effect and facilitate electrical insulation of the circuit elements. Indeed, the brittle nature of the hard ceramic insulator 80 of Stevens renders it impossible to swage the tube 78 to pack the insulating material so as to fix the position of the resistance elements.

Where, as here, the differences in the claimed structure give advantageous results not possible by the cited references, more than a matter of design is involved. Accordingly, claim 36 is submitted as clearly allowable.

Claims 37-50 depend from claim 36 and are submitted as allowable for substantially the same reasons. Also, claims 37-41 further patentably distinguish over the cited references by additionally reciting a moisture barrier surrounding the end portions of the wires between the mineral insulation material and the flexible insulation material, with the metal tube overlying the moisture barrier and being compressed into sealing engagement with the moisture barrier causing the moisture barrier to form a fluid tight seal around the wires. Claim 38 additionally recites that the moisture barrier is made of Teflon which, as described on page 5 of the present application, has the advantage of providing excellent sealing properties and a higher temperature rating than conventional materials.

Moreover, claims 39-41 additionally recite strain relief means between the metal tube and flexible insulation material, with the particular details of the strain relief means being recited in dependent claims 40 and 41. In particular, claims 40 and 41

recite that the strain relief means comprises a flexible plastic tube surrounding the flexible insulation material adjacent the end portions of the wires, with the metal tube overlying the flexible plastic tube and being compressed into firm gripping engagement with the flexible plastic tube. Also, claim 41 additionally recites a metal overbraid surrounding the flexible insulation material which is removed from the flexible insulation material adjacent the end portions of the wires, and that the flexible plastic tube overlies the flexible insulation material adjacent said end portions and a portion of the metal overbraid and is compressed into firm gripping engagement therewith by the metal tube.

For these claim features, the Examiner further relies on the patents to Bargen, Korton or Clawson et al, contending that it would have been obvious to a person having ordinary skill in the art, in view of the teachings of these references, to provide the temperature sensing probe device means in Frazier and/or Stevens with known moisture barrier means and/or known strain relief means for the elements in the probe means for protecting the elements therein from moisture and breakage due to strain from the movement of the elements therein. However, while Clawson et al admittedly shows the use of a thin-walled plastic insulating strain relief tube 38 in a temperature sensor, not in combination with a separate moisture barrier between the mineral insulation material and flexible insulation material in the manner recited in these claims. Moreover, the particular details of applicant's strain relief means as recited in claims 40 and 41 are clearly not shown in Clawson et al in that the outer housing structure 12 of Clawson et al is simply molded around the sheath 22 and insulating strain relief sleeve 38 which has an inner diameter substantially equal to the outer diameter of the cable 8. Also, the moisture barriers 16 of Bargen and 21 of Korton do not surround the end portions of a pair of continuous flexible electrically conductive wires between the mineral insulation material and flexible insulation material, with a metal tube compressed into sealing engagement with the moisture barrier causing the moisture barrier to form a seal around the wires as further recited in these claims.

Claims 45-49 also further patentably distinguish over the cited references by

reciting that the metal tube includes an end portion surrounding the sensor element having an internal size which is less than the initial internal size of the tube and which is the same as the internal size of the tube after the tube has been compressed to a smaller diameter. Moreover, claims 46 and 47 additionally recite that the end portion of the metal tube has an internal shoulder which bears against an end of the preformed cylinder member prior to compressing the metal tube to a smaller diameter; claim 47 further recites that the sensor element has a pair of leads that are inserted in the passages in the cylinder member along with the end portions of the wires prior to compressing the metal tube to a smaller diameter, whereby during such compression, the compaction of the mineral insulation material around the wires ensures good electrical contact between the wires and leads; claims 48 and 49 additionally recite that the end portion of the metal tube is packed with additional mineral insulation material around the sensor element; and claim 49 additionally recites that the distal end portion of the metal tube is welded closed. As will be apparent, none of the cited references, whether taken singly or collectively, discloses or suggests such features in a temperature sensing device of the type disclosed and claimed herein.

For the foregoing reasons, this application is now believed to be in condition for final allowance of all of the claims 36-50 now remaining herein, and early action to that end is earnestly solicited. Should the Examiner disagree with applicant's attorney in any respect, it is respectfully requested that the Examiner telephone applicant's attorney in an effort to resolve such differences.

Respectfully submitted,

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